भारतीय मानक
Indian Standard

IS 14738 : 2017

(Reaffirmed 2022)

नम्य मध्यवर्मी बड़े आधान — विशिष्टि

(पहला पुनरीक्षण)

Flexible Intermediate Bulk Containers (FIBCs) — Specification

(First Revision)

ICS 55.180.99

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March 2017 **Price Group 7**

Transport Packages and Packaging Codes Sectional Committee, TED 24

FOREWORD

This Indian Standard (First Revision) was adopted by the Bureau of Indian Standards, after the draft finalized by the Transport Packages and Packaging Codes Sectional Committee had been approved by the Transport Engineering Division Council.

Indian Standard IS 14738 was earlier published in six parts which were based on ISO/WD 11895 (Parts 1 to 6) brought out by International organization of Standardization (ISO). ISO/WD 11895 (Parts 1 to 6) have not matured into ISO standards. This revised standard has been brought out in one composite standard merging all the six parts of the earlier standard. Major changes in the revised standard are modification in the test method for 'Compression/stacking test', requirement of testing of two specimens for 'Cyclic top lift test', one each having the shortest and vertical dimensions, modification in the FIBC label and incorporation of BIS Certification marking clause.

In the formulation of this standard, considerable assistance has been drawn from the following:

ISO 21898 : 2004 'Packaging - Flexible intermediate bulk containers (FIBCs) for non-dangerous goods', issued by International organization of Standardization (ISO)

BS EN 1898 : 2001 'Specifications for flexible intermediate bulk containers (FIBCs), for non-dangerous goods', issued by British Standards Institute (BSI)

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

Indian Standard

FLEXIBLE INTERMEDIATE BULK CONTAINERS (FIBCs) — SPECIFICATION

(First Revision)

1 SCOPE

This standard specifies materials, construction design and performance requirements for flexible intermediate bulk containers (FIBCs) intended to contain non-dangerous solid materials in powder, granular or paste form and designed to be lifted from top by integral or detachable devices.

2 REFERENCE

The following standard contains provisions, which, through reference in this text, constitute provision of this standard. At the time of publication the edition indicated was valid. All standards are subject to revision and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below:

IS No.	*Title*
15875 : 2009	Intermediate bulk containers (IBCs) for non dangerous goods — Terminology

3 DEFINITIONS

For the purpose of this standard the definitions given in IS 15875 and the following shall apply.

3.1 General Definitions

3.1.1 *Flexible Intermediate Bulk container (FIBC)* — An intermediated bulk container having the body made of a flexible material such as woven fabric, plastics film or paper, designed to be in contact with the contents either directly or through an inner liner and easily foldable when empty.

3.1.1.1 *Heavy duty re-usable flexible intermediate bulk container* — FIBC designed and intended to be used for a multitude of fillings and discharges. An FIBC of this category is both field and factory repairable in such a way that the tensile strength across a repair is at least as great as that of the original.

3.1.1.2 *Standard duty re-usable flexible intermediate bulk container* — FIBC designed and intended to be used for a limited number of fillings and discharges. An FIBC of this category cannot be re-used if damaged, that is, not repairable.

NOTE — Replacement of an inner liner is not considered a repair.

3.1.1.3 *Single-trip flexible intermediate bulk container* — An FIBC designed and intended to be used for one filling only.

NOTE — FIBC of this category cannot be reused. Neither replacement of an inner liner nor repair of the FIBC is relevant to this category.

3.1.2 *FIBC Type* — FIBCs of like design, manufactured using like materials and methods of construction (giving at least equal performance) to the same nominal cross–sectional dimensions within type, by comparison with the samples successfully passing the type test(s) the circumference may be increased by up to 10 percent provided the same geometry is maintained. The design vertical dimensions may be increased to achieve a series of different volumes. Where the type has a base discharge spout, smaller diameter discharge spouts of like design may be used. The presence or absence of an inner liner does not constitute a change of type.

3.1.3 *Safe Working Load (SWL)* — The maximum load which the FIBC should carry in service, as certified.

3.1.4 *Safety Factor (SF)* — The integer quotient between the final test load in the cyclic top lift test and the SWL value rounded at lower side. Safety factors are illustrated as follows:

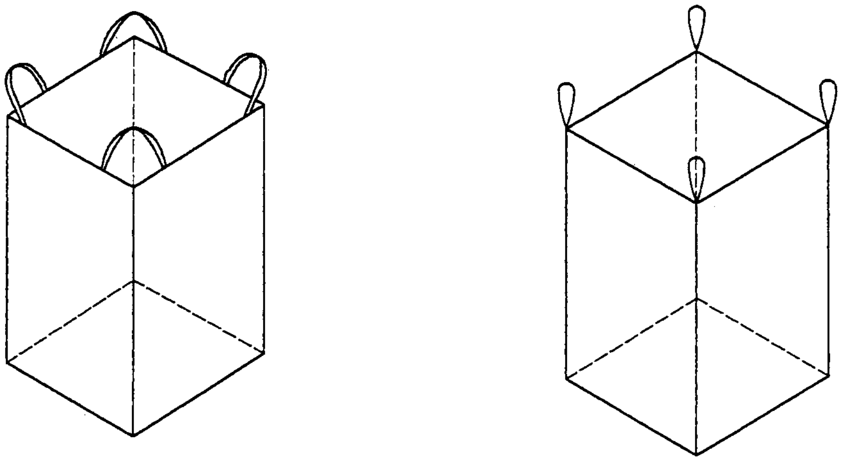
	Illustration 1	*Illustration 2*
Designated SWL	500 kg	500 kg
Final load, cyclic test	2 400 kgf	2 600 kgf
Quotient	4.8	5.2
Integer quotient rounded Lower side	4	5

The results in Illustration 1 indicate a single trip FIBC which does not meet the requirements of this standard whilst those in Illustration 2 indicate a single trip FIBC which meets the requirements.

3.1.5 *Type Test* — A test or series of tests conducted to determine whether the FIBC meets the requirements of this standard.

3.1.6 *Lifting Device* — Integral and/or fixed lifting devices which form part of the FIBC and are tested with it. Lifting devices are shown in Fig.1 to Fig. 5.

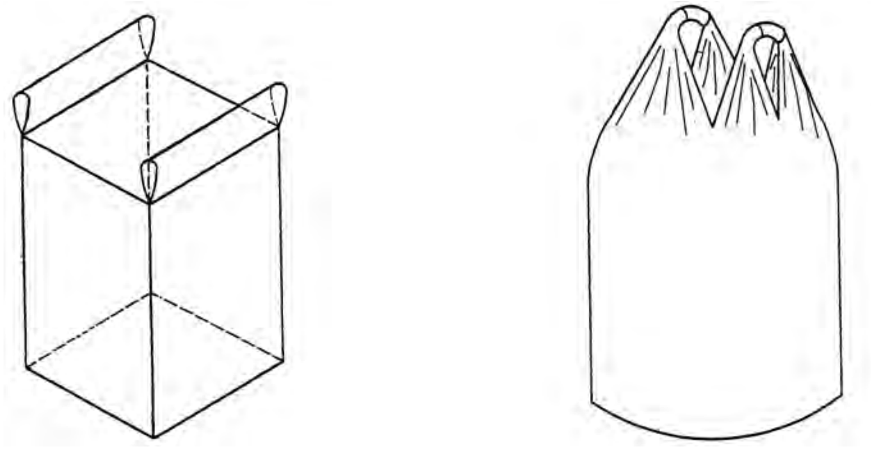
NOTE — Detachable lifting devices are regarded as lifting tools.



Each lifting device fixed at two points

Each lifting device fixed at one points

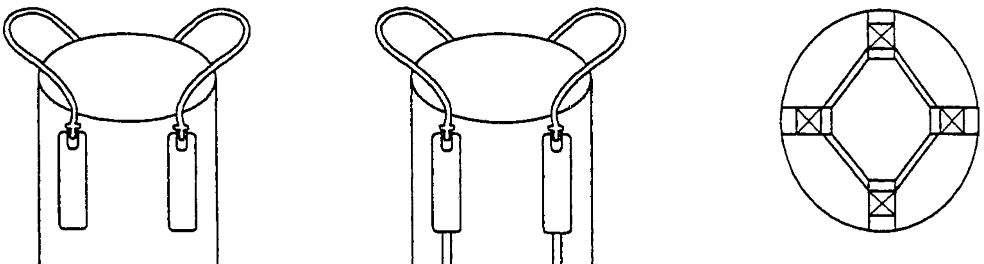
FIG. 1 FOUR POINTED LIFTING DEVICES



Two tubular lifting device

Lifting device formed out of the walls

FIG. 2 TWO POINT LIFTING DEVICES



Two lifting devices fixed on side walls

Two lifting devices fixed on base

BASE

FIG. 3 TWO LIFTING DEVICES

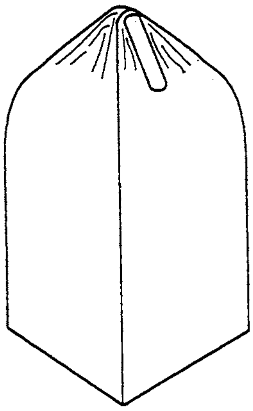


FIG. 4 ONE POINT LIFTING DEVICE

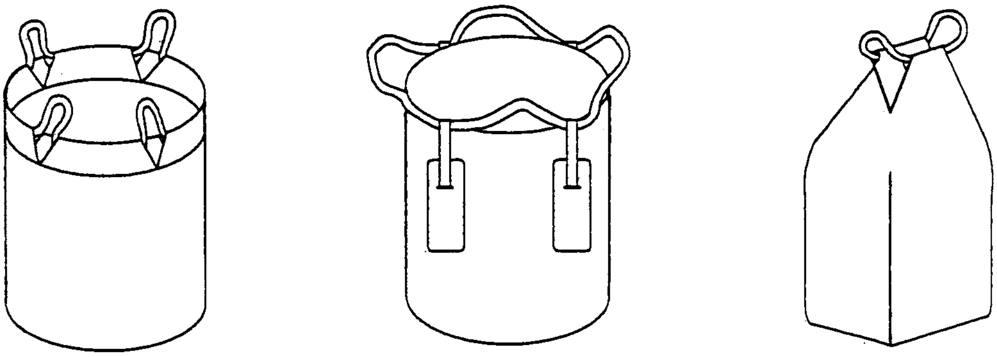


FIG. 5 ROPE LIFTING DEVICES

3.2 FIBC Parts

3.2.1 *Walls* — Tube of one or more layers, seamless or made out of one or more panels joined together.

3.2.2 *Base* — That part of the FIBC which is connected to or integral with the walls and forms the base of the standing FIBC.

3.2.2.1 *Plain base* — Base without an opening.

3.2.2.2 *Base with opening* — Base with opening or flat, can have the Flat Base or conical, square, circular or any other form base, with the opening depending on the customer's requirement.

3.2.2.3 *Full open base* — Extension of opening base to the wall or walls, forming the base of FIBC after closing.

3.2.2.4 *Top* — Upper part of the FIBC, excluding handling devices, forming the top of the FIBC after closing.

3.2.4 *Body* — The walls and base of the FIBC.

3.2.5 *Inner Liner* — Integral or removable container which fits into the FIBC.

3.3 Operating Devices

3.3.1 *Filling Devices*

3.3.1.1 *Filling opening* — Opening for filling the FIBC.

3.3.1.2 *Filling spout* — Tube-shaped part at the top for filling the FIBC (*see* Fig. 6).

3.3.1.3 *Fillings slit* — Slit-shaped opening at the top for filling the FIBC (*see* Fig. 7).

3.3.2 *Discharging Devices*

3.3.2.1 *Outlet* — Opening for discharging the FIBC.

3.3.2.2 *Discharge spout* — Tube-shaped part at the base for discharging the FIBC.

3.3.2.3 *Closing parts* — Webbings, cords, straps, etc, which are used to close the filling and discharging devices.

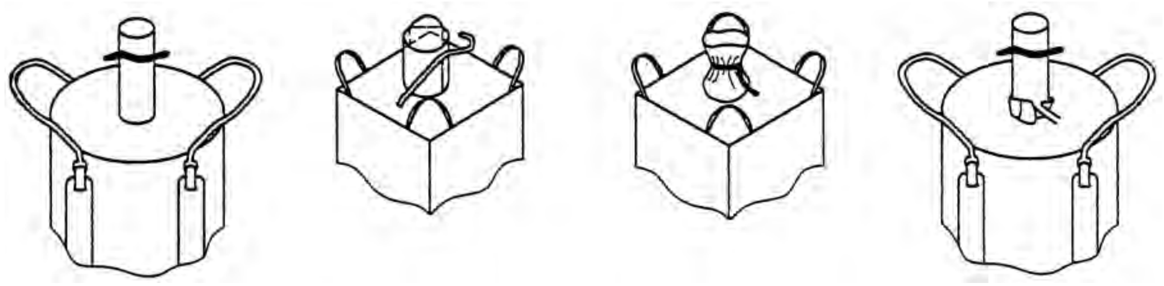


FIG. 6 TOP WITH FILLING SPOUT

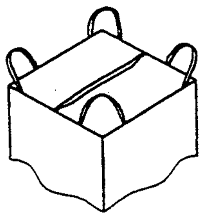


FIG. 7 TOP WITH FILLING SLIT

3.4 Handling Devices

3.4.1 *Supporting and Lifting Devices* — Webbings, loops, ropes, eyes, frames or other devices formed from a continuation of the walls of the FIBC or integral or detachable and are used to support or lift the FIBC.

3.4.1.1 *Four point lifting* — Four lifting devices used simultaneously to lift the FIBC.

3.4.1.2 *Two point lifting* — Two lifting devices used simultaneously to lift the FIBC.

3.4.1.3 *One point lifting* — One lifting device or more lifting devices brought to one point for lifting.

3.5 Safety and Protection Devices

Valves, ventilation devices and additional parts like top with skirt, which protect the filling, discharging or handling devices (*see* Fig. 8).

3.6 Coated and Laminated Materials

Materials having a surface coating or comprising two or more layers laminated together to protect the contents of the filled FIBC or to protect the environment against the leakage of the contents.

3.7 Special Treatments

3.7.1 *Stabilization* — It is the modification of the FIBC materials to give better resistance against weathering and ageing. For example by the addition of an ultra-violet (UV) absorber and or an anti-oxidant

3.7.2 *Electrostatic Conductivity Treatments* — A treatment for modifying the electrostatic behavior of the FIBC.

3.7.3 *Other Treatments* — For example, flame retardant properties, Insect repellent treatment, etc.

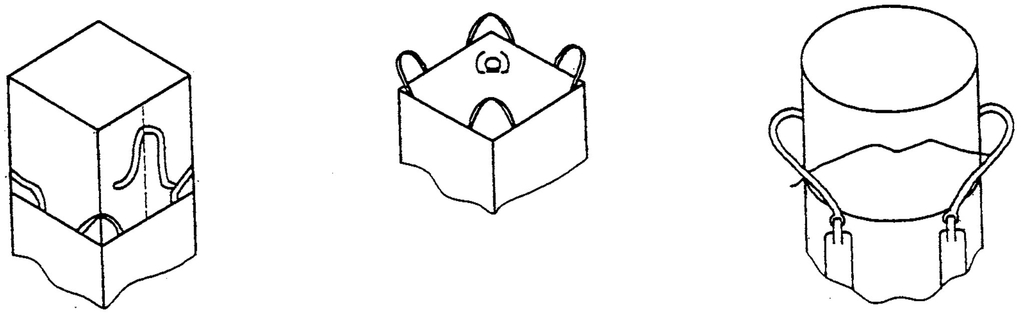


FIG. 8: TOP WITH SKIRT

4 MATERIALS, CONSTRUCTION AND DESIGN

4.1 Materials

4.1.1 FIBC's shall be manufactured from suitable flexible materials. These materials shall be covered by a written specification.

4.1.2 The properties of the materials may be modified by suitable additives to improve the resistance of the materials against, such as, degradation by heat and sunlight and also the effect of static electricity.

4.1.3 All material shall be tested for breaking force and shall be capable of retaining at least 85 percent of the original breaking force after being completely immersed in water for 25 ± 1 h. This measurement shall be taken after drying the test specimen followed by conditioning for 60 ± 5 min at temperature of 27 ± 2 °C and relative humidity of 65 ± 5 percent.

4.1.4 All load bearing materials which are likely to be exposed to sunlight shall, after the UV-resistance test in accordance with the test method at **10**, retain at least 50 percent of the original values of the breaking strength and elongation of the materials.

4.1.5 Materials should be chosen and joined together in such a way that their recovery is possible.

4.2 Construction

All stitched seams and joints shall be locked off and/or back sewn or a minimum 20 mm tail provided. All stitched seam-ends shall be secured. Joints that are welded, glued or heat-sealed, shall be clean.

4.3 Design

Height of the FIBC when filled, shall be between 0.5 and 2.0 times the diameter at the base for FIBCs with a circular cross-section and the length of the shorter side at the base for FIBCs with a rectangular cross-section.

5 PERFORMANCE TESTS

5.1 All types of FIBCs shall be subjected to the following tests:

a) Cyclic top lift test, and
b) Compression/Stacking test.

At least three specimen of each FIBC type shall be submitted for testing leading to certification. Specimen shall be tested as follows:

1) *Specimen 1* — Cyclic top lift test using the FIBC having the shortest vertical dimension.
2) *Specimen 2* — Cyclic top lift test using the FIBC having the greatest vertical dimension.
3) *Specimen 3* — Compression testing using the FIBC having the greatest vertical dimension.

One specimen of the FIBC type shall be taken for each test. An FIBC which has passed one test may be used for other test.

5.2 Selection of FIBC for Testing

5.2.1 FIBC selected for testing shall be representative of the lot being tested.

5.2.2 Where a type of FIBC covers a range of vertical dimensions, FIBC selected for the type tests shall be those with the smallest vertical dimensions.

When the FIBC type has only one fixed vertical dimension, only Specimens 1 and 3 needs to be submitted and tested to withstand the tests.

6 TEST REQUIREMENTS

6.1 Cyclic Top Lift Test

6.1.1 FIBC shall be subjected to a cyclic top lift test in accordance with test method given at **9**, for cycles as given in **6.1.1.1**, **6.1.1.2** or **6.1.1.3** as applicable.

6.1.1.1 *Heavy duty re-usable FIBC*

This contains 70 cycles at 6 times of SWL (Safe Working Load) and a final cycle at 8 times of SWL.

6.1.1.2 *Standard duty re-usable FIBC*

This contains 70 cycles at 4 times of SWL and a final cycle at 6 times of SWL.

6.1.1.3 *Single-trip FIBC*

This contains 30 cycles at a test load of 2 times SWL and a final cycle at a test load of 5 times SWL.

6.1.1.4 *Criteria for Conformity*

After the FIBC has been tested the following conditions shall be satisfied:

a) No breakage of any lifting devices to the extent that any of the lifting devices ceases to support its load;
b) When tested with an inner liner, no protrusion of the latter beyond the outer surface of the FIBC except through the closure(s) where this is a design feature;
c) No loss of contents. A slight discharge on impact, for example, from closures or stitch holes, should not be considered to be a failure of the FIBC provided that no further leakage occurs after the FIBC has been raised clear of the ground; and
d) No deterioration of the body which renders the FIBC unsafe for transport or storage.

6.2 Compression/Stacking Test

6.2.1 *Applicability*

All FIBCs types shall be subjected to the compression/stacking test.

6.2.2 *Calculation of the Superimposed Load*

The load to be placed on the FIBC shall be four times the SWL of the FIBC.

6.2.3 *Duration of the Test*

The load shall be applied for at least 6 h.

6.2.4 *Criteria for Passing the Test*

After the test there shall be no loss of contents and no deterioration of the body which renders the FIBC unsafe for transport or storage.

7 CERTIFICATION

7.1 FIBC type which conforms to the requirements of this standard may be certified by an authorized certifying body with a certificate of conformity based on a successful test report(s). The certificate shall contain the data shown for the marking in **8.1**(a) to **8.1**(p) together with the following:

a) Name and address of the certifying body;
b) Names and address(es) of the test station(s) together with the reference and dates of the relevant test reports; and
c) Material used as contents in the cyclic top lift and compression/stacking tests.

7.2 A certificate for a FIBC type shall be valid for a period of three years from the date of issue.

7.3 FIBC certified and marked as a single trip FIBC in conformity with this standard shall not be re-used.

7.4 An FIBC certified and marked as re-usable (heavy or standard duty) FIBC in conformity with this standard shall be re-used only with the same type of contents as in the first use. Re-use of FIBCs with contents differing from those from the first use is not permitted.

8 MARKING

8.1 All FIBCs which found conforming with the requirements given in this standard shall be marked by means of a permanently attached, easily visible and easily readable label or other means with the following data:

a) Name and address of the holder of the FIBC certificate;
b) Name and address of the manufacturer (where the manufacturer is not the certificate holder);
c) Manufacturer’s reference (which shall be unique to any one FIBC type);
d) Name and address of the supplier of the FIBC (where the supplier is neither the certificate holder nor the manufacturer of the FIBC);
e) Safe working load (SWL), kgf/N;
f) Safety factor;
g) Type of FIBC;
h) Type test certificate;
j) Name of the organization issuing the certificate together with, if space permits, an abbreviated address;
k) Reference to this standard;
m) Date of manufacture of the FIBC, month and year;
n) Pictograms of the recommended handling methods; and
p) Not UV stabilized, (if applicable).

NOTE — The layout of the label shall be as mentioned below:

Manufacturer's Name and Address Manufacturer’s Reference	
S.W.L...... Kg Safety Factor.....:	
	Test Certificate No.
	Test Certificate Date:
	Approved Laboratory:
	Test Standard
	F I B C Class
	Date F I B C Manufactured:
	Specific Treatments (if required)
	Certified only for (if required)
Handling recommendations/Pictograms	
Suppliers name and address (if required)	

8.2 BIS Certification Marking

The flexible intermediate bulk containers may also be marked with the Standard Mark.

8.2.1 The use of the Standard Mark is governed by the provisions of the *Bureau of Indian Standards Act, 1986* and the Rules and Regulations made thereunder. The details of conditions under which the license for the use of the Standard Mark may be granted to be manufacturers or producers may be obtained from the Bureau of Indian Standards.

9 TEST METHOD – CYCLIC TOP LIFT TEST

9.1 Apparatus

The filled FIBC is suspended from a frame and a flat pressure plate is positioned on top of the contents. The flat plate is restrained either from above or below. An upward force is applied progressively to the frame lifting the FIBC against the resistance of the flat pressure plate. The filled FIBC is subjected to a repeated loading, unloading and dwell cycle. The force is recorded and the FIBC observed for breakage of any lifting device, other damage, or leakage of contents.

9.2 Suitable Suspension Frame, such that the filled FIBC may be suspended clear of the ground with its lifting devices-position as recommended by the manufacturer. Key features of the apparatus are illustrated in Fig. 9 to Fig. 12 and details are given as under:

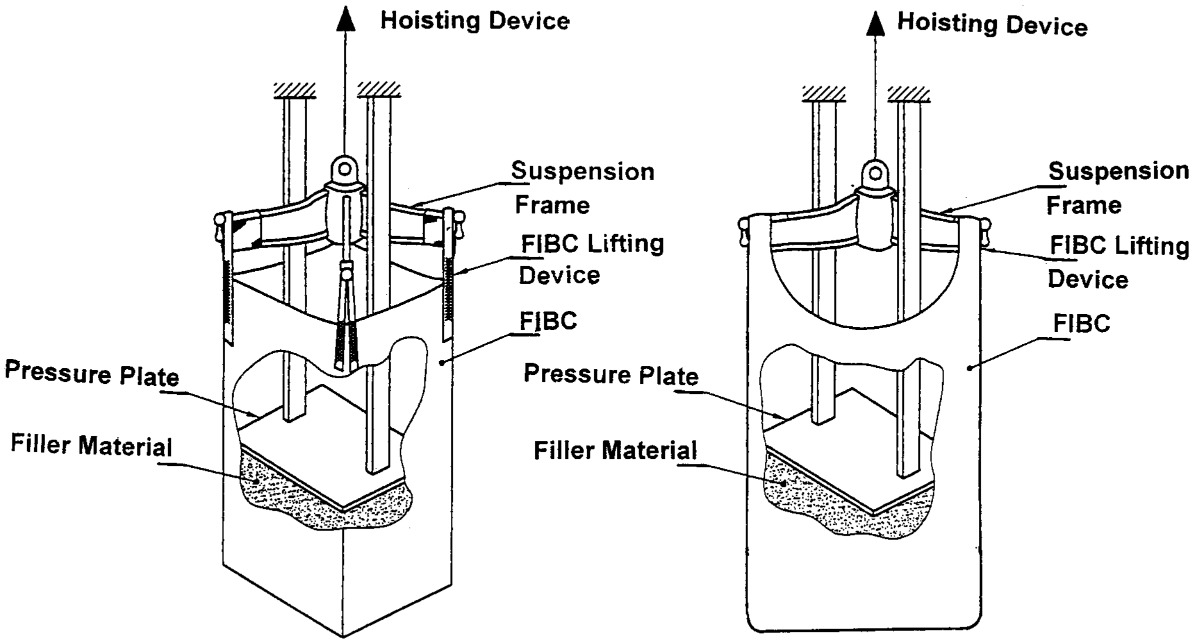


FIG. 9 MULTI-POINT LIFT FIBCS SUSPENDED USING TOP RESTRAINT

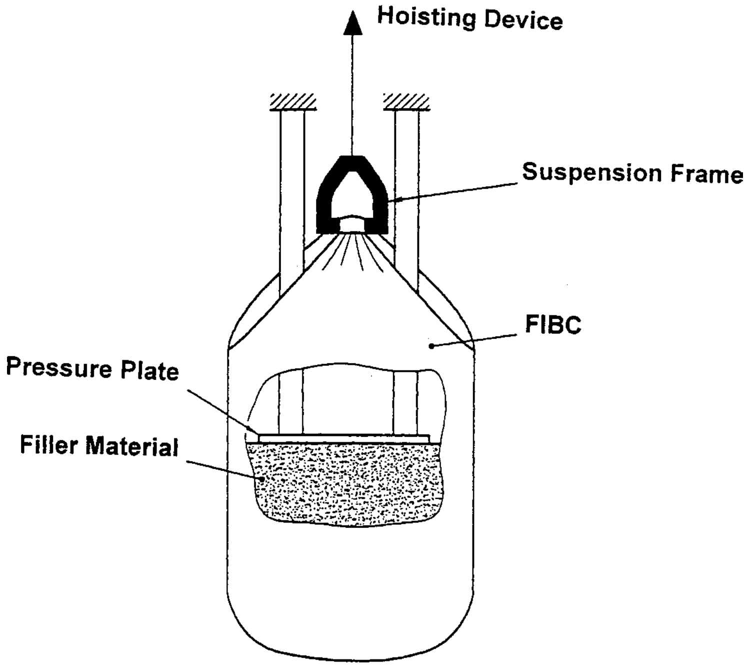


FIG. 10 SINGLE-POINT LIFT FIBCS SUSPENDED USING TOP RESTRAINT

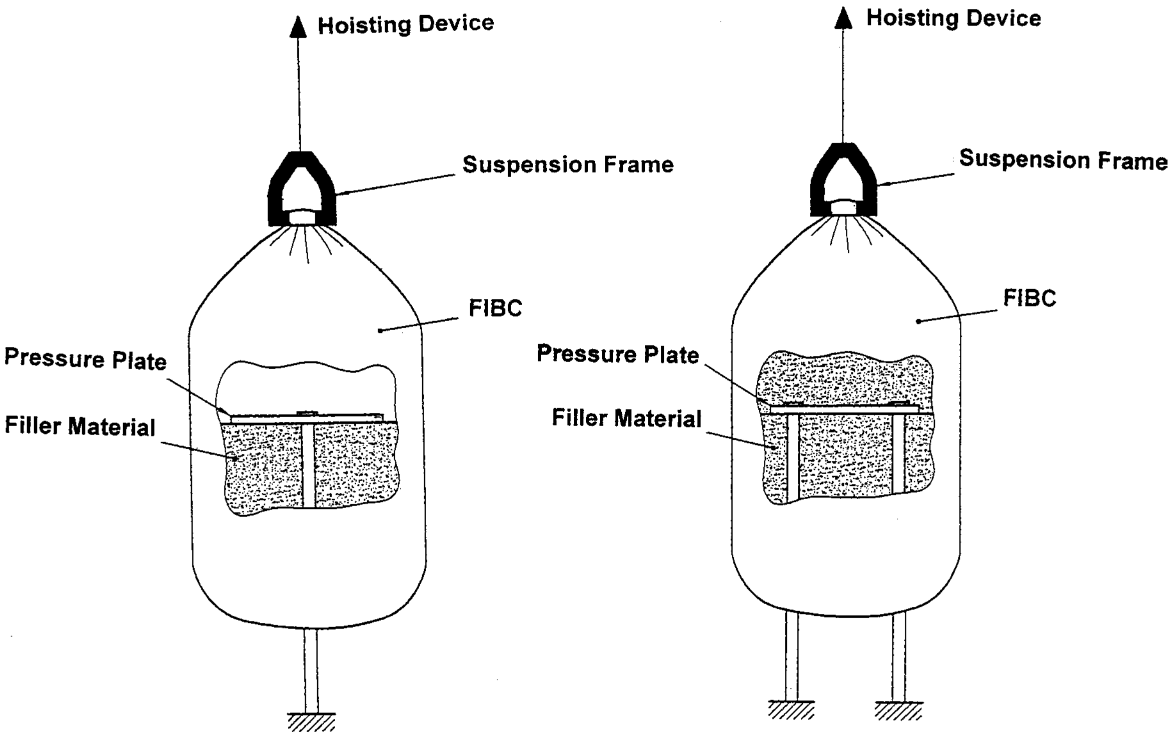


FIG. 11 SINGLE-POINT LIFT FIBCS SUSPENDED USING BASE RESTRAINT

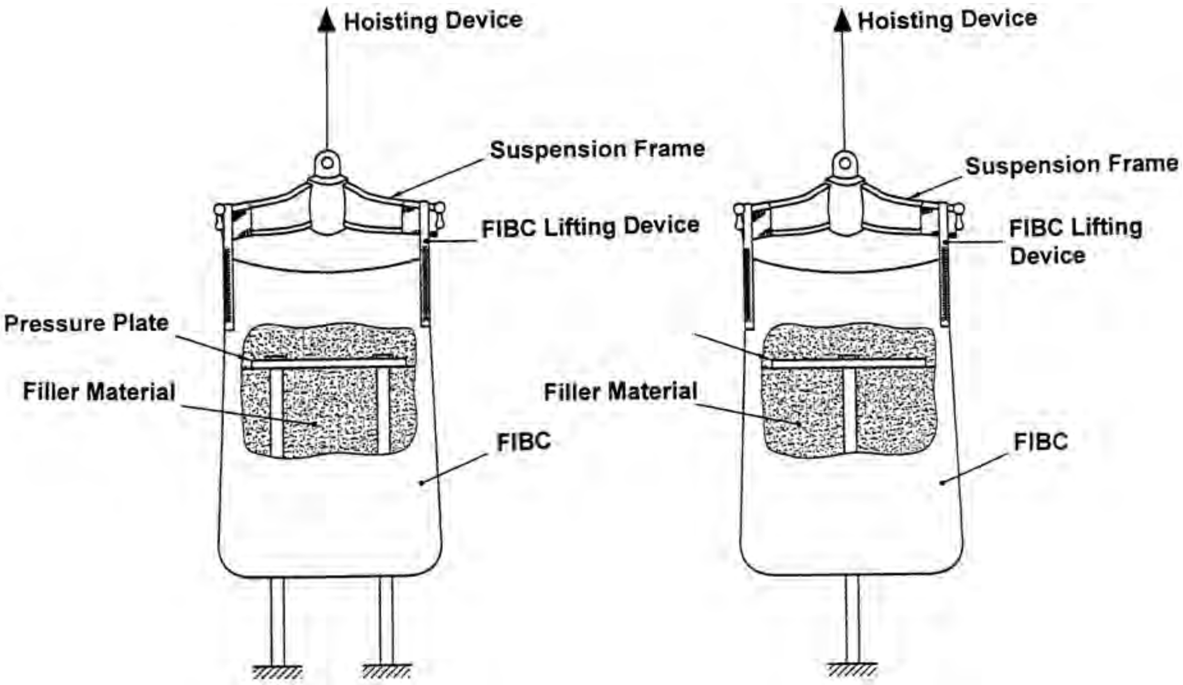


FIG. 12 MULTI-POINT LIFT FIBCS SUSPENDED USING BASE RESTRAINT

9.3 The cross-section of that part of the frame supporting the FIBC lifting devices shall be as shown in Fig. 13 (four and two point lift) and Fig. 14 (single point lift).

Dimensions in millimetres

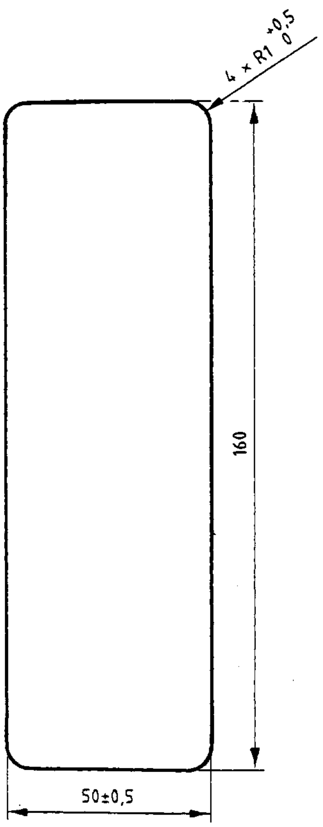


FIG. 13 CROSS-SECTION OF SUSPENSION FRAME-TOP LIFT TEST FOR FIBCs

Dimensions in millimetres

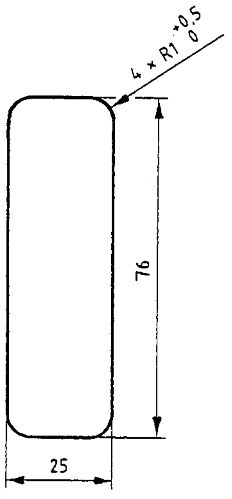


FIG. 14 CROSS-SECTION OF SUSPENSION FRAME-TOP LIFT TEST FOR FIBCs WITH SINGLE POINT LIFTING

9.4 A flat pressure plate, of such size that it covers between 60 and 80 percent of the surface area of the contents, restrained from above or below by means of an appropriate structure such that it resists, without deformation of the forces applied.

NOTES

1 Flanges may be fitted to the underside of the plate to prevent lateral displacement.

2 As illustrated in Fig. 11 and Fig. 12, restraining the pressure plate may require connections passing through the body of the FIBC and its test contents. A suitable method involves passing through the body of the filling material. Considerable care should be taken.

9.5 With woven fabrics, threads should be separated rather than cut and the rod shall pass through the base no closer than 20 mm to any base seam or joint. Two restraining rods (*see* Fig. 11 and Fig. 12) shall be used for FIBCs which have a seam or joint running across the centre of the base. It is recommended that a conical adapter is screwed to the top of each rod and removed once the FIBC is in position. Suitable nuts should be used to connect the rod(s) to the pressure plate and to a suitable restraint.

9.6 Means of applying an upwards force to the suspension frame, at least equivalent to the requirement of the required test load, fitted with a means of registering the force applied.

9.7 Preparation of the Test Specimen

The FIBC to be tested shall be filled and conditioned in accordance with **9.7.1** and **9.7.2**.

9.7.1 *Filling*

9.7.1.1 For both the top lift and compression/stacking tests, the FIBC shall be filled-up to the filling level recommended by the manufacturer with a tolerance $^{-0}_{+5}$ percent of that height.

9.7.1.2 The FIBC shall be filled with:

a) the material, for example, plastics granules, having the following mechanical properties:

    1) Bulk density : 0.5 to 0.9 kg/l
    2) Mesh size : 3 to 12 mm
    3) Angle of repose : 30 to 35°

or

b) the actual contents to be carried, when these are known and where their usage will not itself be a hazard. When this option is chosen the FIBC shall be certified for use with specific product only.

9.7.2 *Conditioning*

9.7.2.1 The filled FIBC shall be conditioned before testing at ambient temperature and relative humidity. However, in the event of a dispute, testing should be done after conditioning at 27 ± 2 °C and 65 ± 5 percent relative humidity.

9.8 Procedure

a) Locate the filled FIBC on the suspension frame with the lifting devices positioned as recommended by the manufacturer for multi-point or single point lifting.
b) Position the flat pressure plate above the contents in such a way that there is no contact between the edge of the plate and the material of the FIBC during the test.
c) Raise the frame to bring the filling material into contact with underside of the pressure plate.
d) Continue raising the frame by application of the upward force at a rate of 70 ± 20 kN/min until the total force equivalent to the specified test load is registered.
e) Remove the applied force.
f) Allow a dwell period of not more than 30s before repeating the cycle.
g) Repeat the test cycle until the specified number of cycles have been completed.
h) Carry out a further test cycle to the appropriate load specified for the final test cycle.

NOTES

1 Any top panel not designed to contribute to the overall strength of the FIBC may be removed to allow the entry of the test apparatus. The area removed should be the minimum commensurate with efficient operation of the test apparatus.

2 After this test is complete, further loading may be applied until failure of the FIBC, to provide additional information. When this is done. The load at failure will together with other relevant test observations, be recorded in the test report. There is no requirement, however, for the load at failure (if it is greater than the specified test load) to be noted in the certificate or reflected in the marking of the FIBC.

9.9 Test Report

The test report shall record at least the following information:

a) Test title/reference;
b) Name and address of the test station and the location at which the test was carried cut;
c) Name and address of the manufacturer of the FIBC and the location at which it was manufactured;
d) Manufacturer's description of the FIBC should include,
    1) manufacturer's reference (unique to type);
    2) dimensions;
    3) method and materials of construction;
    4) description of lifting devices;
    5) description of discharge devices;
    6) description of inner liner(if fitted); and
    7) tare mass.
e) The Safe working (SWL) stated by the manufacturer for single-trip and /or multi trip use;
f) Filling level recommended by the manufacturer's;
g) Filling material used and the gross mass of the FIBC as tested;
h) Apparatus used, method of restraint and dimensions of the restraining plate and cross section of suspension frame;
j) Test load, in Newton, applied to the FIBC and the number of test cycle carried out at each load. The test load will also be shown converted into kilograms force in order to facilitate calculation of the safety factor;
k) Results of the test, including whether leakage of contents, breakage or loosening of lifting devices, or protrusion of the inner liner (if fitted) took place;
m) Results of inspection to conform that the FIBC submitted for test conformed firstly to the definitions and requirements of this standard and secondly to the manufacturer's description of the type;
n) Date of the test; and
p) Signature of the tester.

10 TEST METHODS — UV-RESISTANCE TEST

10.1 Applicability and Test Requirement

All load bearing materials of the FIBCs which are likely to be exposed to sunlight shall be subjected to this test and after the test, the material shall retain at least 50 percent of the original values of the breaking strength and elongation.

10.2 Breaking Strength and Elongation

The determination of the breaking strength and elongation of the material before and after the UV-resistance test shall be performed.

10.3 Selection of Materials for Testing

10.3.1 Samples of load bearing materials selected for testing shall be representative of the materials of the FIBC type for which certification of conformity with this standard is sought.

10.4 Test Procedure

The test specimen shall be exposed with fluorescent UV lamp type B for at least 200 h using test cycle of 8 h at 60ºC with UV-radiation alternating with 4 h at 50ºC with condensation. After exposure is complete, test the specimen for breaking force and elongation at break using the conditioning requirements given at **9.7.2**. Compare the values with results performed on simultaneously cut specimens that have been stored under dark and cool conditions.

10.5 Test Report

The test report shall record at least the following information:

- a) Test title/reference;
- b) Name and address of the test station and location at which the test was carried out;
- c) Name and address of the manufacturer of the material and the location at which it was manufactured;
- d) Manufacturer's description of the material to include:
  - 1) manufacturer's reference (unique to type);
  - 2) dimensions; and
  - 3) method and materials of construction.
- e) Type of apparatus and type of lamp used and method used;
- f) Duration of test, and test cycle;
- g) Breaking strength and elongation of the material measured on simultaneously cut samples:
  - 1) Tested before exposure to the UV-radiation; and
  - 2) Tested after exposure to the UV-radiation.
- h) Results of inspections to confirm that the material submitted or test conformed to the manufacturer's description of the type;
- j) Date of the test; and
- k) Signature of the tester.

11 GUIDANCE ON SELECTION AND USE OF FIBCs

11.1 Selection of FIBCs

When selecting an FIBC for use consideration shall be given to,

- a) the physical and chemical properties of the intended contents of the FIBC, such as:
  - 1) bulk density;
  - 2) flow characteristics;
  - 3) degree of aeration;
  - 4) particle size and shape;
  - 5) compatibility with the materials used for the construction of the FIBC;
  - 6) fill temperature; and
  - 7) whether the intended contents are food stuffs, when special conditions normally apply.
- b) the methods to be used for filling, handling, transporting, storing and emptying the FIBC;
- c) the number of trips required, the number of times the bag is lifted on each trip, and the environmental conditions likely to be encountered; and
- d) general environmental considerations.

NOTE — Where methods of handling are known and can be controlled (such as in-house use), it may be possible to use a standard duty FIBC, compared with the situation where the handling methods are not known and cannot be controlled (such as export to remote destinations), where a heavy duty reusable may be more appropriate.

11.2 Storage of Empty FIBCs

Empty FIBCs and liners shall be stored in such a manner that accidental damage and exposure to sunlight, extreme climate conditions and harmful substances are avoided. Where liners are supplied with the FIBCs they may be delivered either fitted inside the FIBCs or separately. In both instances care shall be taken to avoid contamination. Liners are vulnerable to damage which may not always be visible obvious, and therefore shall be given particularly careful handling and storage.

11.3 Filling of FIBCs

11.3.1 FIBCs are normally filled suspended using the lifting device(s) and with the base of the bag on or near the ground or a pallet. Other methods may be applicable in consultation with the manufacturer or supplier.

11.3.2 If the FIBC has a discharge spout or other discharging device this shall be tied off or closed before filling.

11.3.3 Before filling with material at a temperature above 60°C the manufacturer or supplier shall be consulted.

11.4 Stability of Filled FIBCs

The FIBCs shall be filled so that the ratio of filled height to base is between 0.5 and 2.0 using as base dimension. The diameter of FIBCs with a circular cross-section and the length of the shorter side for FIBCs with a rectangular cross-section.

NOTE — Other major factors which affect the stability of filled FIBCs are the flow characteristics of the contents, free space and air entrapment.

11.5 Lifting of Filled FIBCs

11.5.1 Before lifting any FIBC, it shall be inspected for any damage which may render it unsafe. The lifting loops or other lifting devices shall be positioned according to the manufacturer's instructions. The hooks, bars or forklift arms employed for lifting shall be inspected to ensure that they have rounded edges with a radius greater than the diameter or thickness of the suspension of the FIBC and/or be protected by wrapping. The rounded edges shall have a minimum radius of 5 mm. The necessary characteristics are shown in Fig. 15.

11.5.2 When the FIBC is suspended personnel shall not be around in the area under the FIBC.

11.6 Storage of Filled FIBCs

11.6.1 Storage of filed FIBCs at a temperature above 50°C shall be avoided except with the approval of the manufacturer or the supplier.

11.6.2 Filled FIBCs shall have any top closures properly closed before storage. Except for FIBCs which have been specifically designed for outdoor storage, all FIBCs stored outdoor shall be sheeted over to prevent water collection on the tops of the FIBCs and shall not be stored in standing water.

11.7 Emptying of Filled FIBCs

FIBCs may be emptied by suction and by certain types of blowing, but they are usually emptied by gravity. The flow characteristics of the contents and the cost of ancillary equipment will generally dictate which method is chosen. When emptying by gravity, personnel shall not stand under the FIBC nor put their arms between the base of the FIBC and a receiving vessel or similar except where the FIBC is supported.

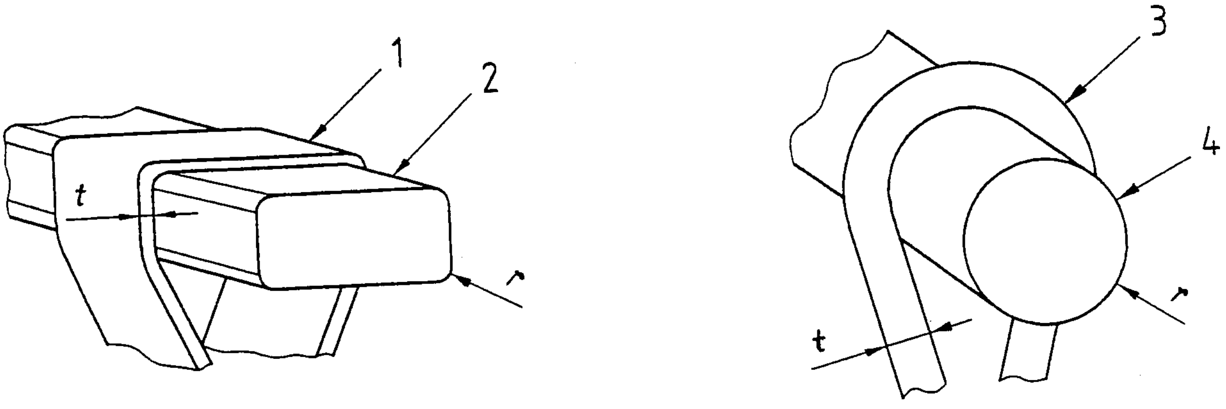
11.8 Inspection of Heavy Duty and Standard Duty FIBCs

Before reuse of FIBCs, consideration shall be given to the possibility of contamination from previous contents. Before reuse, FIBCs shall be thoroughly examined for damage to stitching/gluing/welding and for surface abrasion, cuts, tears or any other damage to the bag. Particular attention shall be paid to the lifting loops or devices and their attachments. The examining person shall look for the following:

a) *Abrasion* — The effects of abrasion are variable, but some loss in strength is to be expected. In extreme cases, the fabric becomes so worn that the outer yarns of the weave are severed. On lifting loops or devices, localized areas of abrasion may be present caused by handling equipment with sharp edges and these areas can result in a serious loss in strength.

b) *Cuts, contusion* — Cuts, particularly in the lifting loops or devices, shall result in a serious loss of strength.

c) *Ultraviolet degradation and/or chemical attack* — These may be indicated by the



Key

1 FIBC suspension (for example webbing loop)
2 lifting device (for example fork-lift arm)
3 FIBC suspension (for example rope)
4 lifting device (for example fork-lift arm or crane)

NOTES

1 The value of *r* should be greater than *t*. The minimum value of *r* is 5 mm.

2 When the FIBC is suspended, personnel should be excluded from the area under the FIBC.

FIG. 15 CHARACTERISTICS OF LIFTING DEVICES

softening of the material (sometimes with discoloration) so that the outer surface can be rubbed off or plucked off, an in extreme cases the outer surface may become powdered.

d) *Damage to coatings* — Some FIBCs are manufactured from coated polyolefine fabric and the coating may be on the inside and/or outside of the bag. Consideration shall be given to the possible contamination of the contents by an unacceptable level of coating fragments if an inside coating is damaged and to the increased possibility of moisture ingress (particularly if the contents are hygroscopic) when damage occurs to either the inside and/or outside coatings. When damage affecting the strength of the FIBC is discovered the FIBC shall be taken out of service immediately.

11.9 Repair of Heavy Duty FIBCs

Repairs shall be carried out so that the repaired FIBC is capable of meeting the requirements of new FIBCs as marked on the label. Before undertaking any repairs, the manufacturer or supplier shall always be consulted. Factors which shall be taken into account in deciding whether the FIBC is field repairable, factory repairable or not repairable include:

a) Materials of constructions;
b) Type and area of damage;
c) Age of the FIBC;
d) Conditions to which the FIBC has been subjected during service; and
e) Location of the damage.

11.10 How to Use FIBCs

Do's	Don't
Select the right FIBC for the job in consultation with the manufacturer or supplier	Choose FIBCs without consulting the manufacturer or supplier
Read the instruction label on the FIBC	Exceed the SWL in any circumstances
Inspect reusable FIBCs before refilling	Fill the FIBCs unevenly
Check that the discharge spout is closed off before filling	Stop or start suddenly during transportation
Ensure that the filled FIBCs is stable	Subject FIBCs to snatch lift and/or jerk stops
Close the top inlet correctly	Drag FIBCs
Use lifting gear of sufficient capacity to take the suspended load	Allow personnel under suspended FIBCs
Adjust the distance between forklift arms to the correct width for the FIBC being handled	Allow FIBCs to project over the side of a vehicle or pallet
Tilt the mast of the forklift truck rearward to an appropriate angle	Tilt the mast of the fork lift forward
Ensure that crane hooks, bars or forklift arms used or lifting are adequate size and are rounded to at least the thickness of the sling, belt or rope suspension, with a minimum radius of 5 mm	Withdraw the forklift arms prior to relieving all the load on the lifting devices
Take appropriate measures in regard to dust control	Stack FIBC unless sure of stability
Consider the possibility of static electricity hazards	Use FIBCs in new conditions without consulting the manufacturer or supplier
Protect the FIBCs from rain and/or prolonged sunlight	Reuse single-trip FIBCs
Ensure that FIBCs are adequately secured in transportation	Repair heavy-duty reusable FIBCs unless the as-new requirements can be met

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This Indian Standard has been developed from Doc No.: TED 24 (0849).

Amendments Issued Since Publication

Amend No.	Date of Issue	Text Affected

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Published by BIS, New Delhi